



Integrated Robotic Total Station

Contactless Monopile Position, Elevation and Rate of Penetration With Rate of Descent

Zupt's Integrated Robotic Total Station (iRTS) is a high accuracy, contactless positioning system purpose built for offshore monopile installation. Designed to meet the demands of real time positioning in renewable energy projects, the iRTS determines the position, rate of penetration, and final elevation of a structure with precision without requiring physical contact with the pile or hammer assembly.

Monitoring monopile penetration rate and final elevation is essential for maximizing operational efficiency during installation and monitoring and potential pile run. However, conventional methods such as mounting GNSS receivers or sensors on the hammer, gripper, or pile often fall short when accuracy is needed most. As the pile nears its final elevation, GNSS visibility becomes increasingly limited due to obstructions from cranes, slings, spreader bars, and other deck equipment.

Zupt's iRTS solves these challenges by combining redundant sensors, advanced data processing, and real time tracking capabilities. The system delivers reliable positioning performance even in low visibility and high obstruction environments, giving operators the confidence and accuracy required to optimize offshore installation operations.

Real-time, absolute monopile elevation determination

reliability and redundancy.



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Zupt is a global leader in offshore survey solutions. We develop all core technologies in-house to deliver accurate subsea positioning, modeling, and monitoring for oil and gas, renewables, and marine construction projects worldwide.

Integrated Robotic Total Station Key Features:

- Real-time monitoring of structure position in an absolute reference frame
- Update rate of >5Hz when tracking prism, automated prism tracking
- Designed for both fixed and floating vessels with navigation grade IMU option
- RTK GNSS accuracy precisely offset to prism on the targeted structure
- GNSS, IMU, Total Station integration for accurate absolute positioning and elevation
- Full remote control functionality for ease of operation



iRTS Description:

Zupt's iRTS system delivers real-time, high-accuracy positioning to support offshore monopile installations. Built for both floating and fixed vessels, it enables continuous tracking of penetration rate and final pile elevation, even in dynamic offshore conditions.

The system integrates survey-grade RTK GNSS, a 200Hz navigation-grade IMU, and robotic total stations tracking shock-mounted prisms on the hammer or gripper. This allows the iRTS to maintain functionality during vessel motion and short-term GNSS outages, with RTK recovery required for outages over 10 seconds.

Two robotic total stations are mounted high on the vessel for strong GNSS visibility and a reliable overdetermined solution. The system is adaptable to various vessel layouts and installation methods, offering improved control, safety, and efficiency for offshore wind projects.

